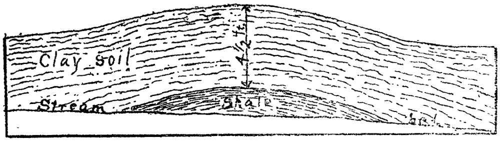
larger numbers and worked more industriously, for the present ant-hills are diminutive as compared with the mounds.

For some time the writer has entertained a theory very similar to that mentioned by Professor Branner. As above stated, these mounds are always on clay soil. In the Paleozoic region of Arkansas, they are on residual clay soils only a few feet deep, and of shale origin. As stated, the drainage where they occur is usually poor. These facts point to the action of ground-water within the clays or shales as being in some way responsible for the mounds. The action is thought to be one of the segregation of mineral matter, or as Professor Branner puts it, 'concretionary action on a large scale.' After the segregation, the volume may be further increased by hydration, oxidation and other chemical changes.

This idea was first suggested by a section of one of these mounds in the Arkansas valley that was brought to view by a small stream having cut its way through it and into the shale below, as shown in the figure. The uneroded portion of the mound was typical of



Section of a natural mound cut through by a stream.

the hundreds in the vicinity, and the general conformity of the surface to the arch of the shale would lead one to believe that the mound was due to the lifting of the shales beneath. While the writer has seen many sections through these mounds, this is the only one that discloses the shales, so that its value lies only in its suggestiveness.

In the Paleozoic region of Arkansas these mounds occur on at least three different beds of shale, two of which belong to the Lower Carboniferous, and the remaining one or more to the Coal Measures. These are all carbonaceous, clay shales. If their cause should prove to be a chemical one, induced by the action of ground-water, the question will present itself as to why they do not have a wide geographic distribution as well as a geologic one. The explanation would probably be found in the climatic conditions where the mounds occur. But this is scarcely worth speculating on till the origin of the mounds is determined. A. H. Purdue.

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THE BASALT MOUNDS OF THE COLUMBIA LAVA.

The recent discussion of various types of mounds of uncertain origin leads me to call attention to a form common in eastern Washington, which seems thus far to have escaped printed notice. Very conspicuous examples are found in the vicinities of Spangle and Medical Lake. Similar ones occur near Winona in the old bed of the Palouse River. Less striking examples are generally found along the crests of all the canyons hewn out by streams in the basalt, especially on the north walls. The general proportion of these mounds is about that of an upturned saucer, but occasionally more convex. The most conspicuous are about four feet high, about twice the height of the more usual ones. In diameter they vary from ten to twenty feet, or rarely more. The first generalization that forces itself upon one is that these mounds occur only where there has at one time been flowing water. They are conspicuous enough even at the top of Snake River canyon, though the river now flows on a bed two thousand feet below. Where these mounds occur along the crests of canyons there is usually but a single series of them. Where, on the other hand, they occupy the old beds of broad shallow streams, as at Medical Lake and near Spangle, there may be acres of them, rather evenly scattered, and often quite close together.

The soil of these mounds shows no appreciable difference from the surrounding soil of basaltic origin, and except in the rare cases where water stands about their bases, they do not support a vegetation more or less luxuriant than that of the surrounding soil. There is nothing, in short, in the structure of the ordinary mounds to give a clue to their origin.

A splendid series of these mounds along the lower Palouse River in the vicinity of Winona would seem, however, to point clearly to their mode of origin. No feature of the Columbia Basalt is more conspicuous than the isolated castle-like towers and crags that persist wherever there has been surface erosion. On the walls of canyons these are especially striking. One scarcely needs more than ocular evidence to know that these persisting crags have remained because formed of harder material. Actual experience in blasting ditches through the top of such a persisting crag demonstrated it to be many times harder than ordinary basalt, and of a somewhat different structure.

In the old bed of the river near Winona the series of mounds shows every gradation from rock caps to mounds of basalt boulders; and from these to ordinary basaltic soil. The conclusion seems unavoidable, therefore, that these mounds are the result of decaying basalt caps, from about which flowing water had previously worn the softer surrounding rock.

The cause of these harder basalt centers may be analogous to that of nodules. Be that as it may, they seem to be quite evenly distributed through the rock, as evidenced not only by their fairly regular occurrence on canyon walls, but especially by the distribution of the mounds in old shallow stream beds.

It was mentioned above that along canyons the mounds were discernible mainly on the north walls. This is due to the prevailing winds of the region being southwesterly, a fact that has led to the deposition of a considerable layer of fine soil on the south walls, and, therefore, the mounds are buried. The occurrence of the mounds only on the crests is doubtless owing to the much greater effect of erosion on the slopes.

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SPECIAL ARTICLES.

LEVELING WITHOUT BASELEVELING.

SINCE the widespread adoption of Powell's views regarding baseleveling, whereby the earlier views regarding marine planation have been so generally displaced, truncated uplands—that is, uplands whose deformed structure is truncated by their surface—have come to be very generally interpreted as uplifted and more or less dissected peneplains. Doubt has been thrown, properly enough, on this interpretation in cases where the dissection of a supposed upland has progressed so far as to transform it into a series of discontinuous and uneven hills; but the interpretation has usually and deservedly had full acceptance in those cases where the dissection of the upland was but little advanced and where the inter-valley upland areas still preserved nearly plain surfaces, whose previous continuity across the valleys could not be reasonably questioned. It is evident, however, that the correctness of this interpretation depends on the impossibility of the production of similarly truncated uplands independent of normal baselevel; and those physiographers who have inferred crustal elevation on the evidence of truncated uplands have doubtless been convinced that this impossibility was demonstrated. True, it has long been understood that the processes of erosion and deposition in desert interior basins might result in leveling above baselevel, the waste from the highlands going to fill up the original depressions; but it does not appear that this process has been regarded as possibly accounting, after a change to a humid or normal climate and without any uplift, for the occurrence of truncated uplands in non-desert regions.

A recent article by Dr. Siegfried Passarge, of Steglitz, Germany, opens new possibilities in this direction. After extended observation on the desert plains of southern Africa, fully described in his book, 'Die Kalahari' (Berlin, 1904), Passarge concludes that these plains are the result of leveling without baseleveling, through the combined action of wind and water erosion; and that such plains, nearly everywhere showing a rock surface independent of structure and interrupted only here and there by residual hills or mountains—which he calls by Bornhardt's term 'Inselberge'—may be produced over large areas at any altitude above baselevel. His article, Rumpfflächen und Inselberg (*Zeitschr. deut. geol. Gesellsch.*, LVI., 1904, Protokol., 193–209), in which this